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(54) **Drill device for controlling the angle of the drill bit during drilling**

(57) Drill device for controlling the angle of the drill bit with respect to the surface to be drilled, characterized in that it comprises a tubular component (12) provided at one end with means for fixing it to the head of a drill; a tubular component (17) able to slide telescopically inside the other end of the said tubular component (12); and a tubular tool attached at one end to the free end of the said tubular component (12) and provided at its other end, which is intended to be placed against the surface to be drilled, with a ring of nonslip material (27), a cylindrical compression spring (20) being installed between the said tubular components (12) and (17).

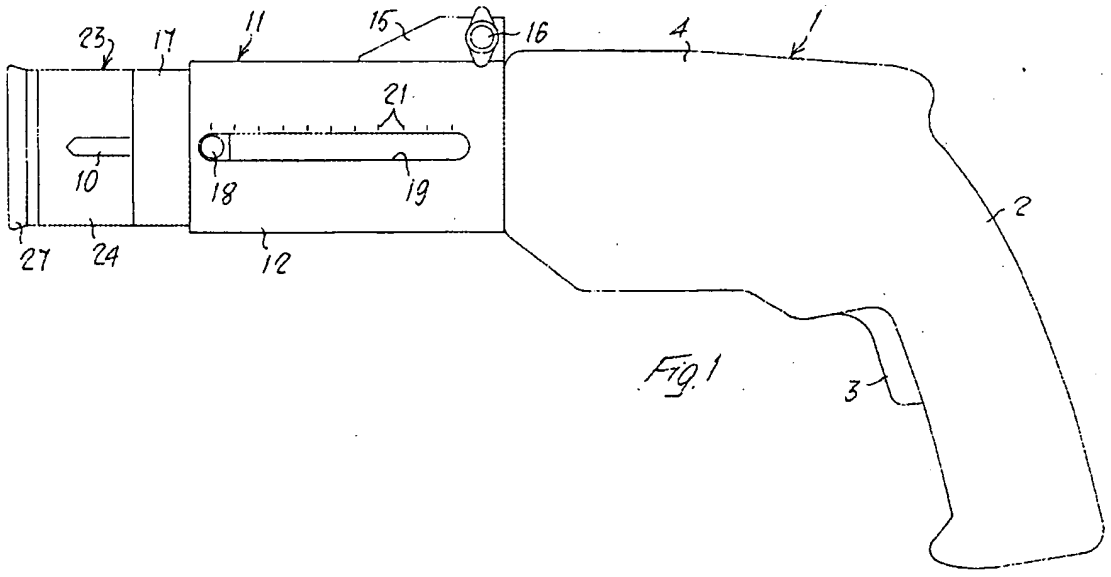

Fig. 1

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Description

[0001] The present invention relates to electric drills, and more particularly to a device applicable to a drill for controlling the position, angle and depth of penetration of the bit during the drilling operation.

[0002] The difficulties of using electric drills for drilling very hard and/or smooth surfaces, such as metal plate, ceramic tiles and the like, are well known: when drilling begins, the drill bit tends to wander away from the exact predefined point. Furthermore, with such drills it is not always easy to keep the bit at the desired angle with respect to the surface to be drilled, either when this angle is supposed to be perpendicular to the surface, or when the angle should be other than 90°, which is even more difficult.

[0003] Again, another problem connected with the use of such drills is the difficulty of gauging exactly how far the bit has advanced into the material being drilled.

[0004] And lastly, the operator can suffer serious accidents if the drill slips.

[0005] The main object of the present invention is therefore an inexpensive device that can be fitted easily to any drill and that is capable of solving all the problems associated with keeping the drill bit at the exact desired angle and position, with the further possibility of monitoring moment by moment during drilling the depth of penetration of the bit into the material, and that will ensure the maximum operator safety.

[0006] This is achieved with a device as claimed in Claim 1.

[0007] Another object of the present invention is a device of the type indicated above with means for collecting and retaining during drilling the dust and fragments of material produced as the hole is drilled, without allowing them to escape into the environment.

[0008] Other objects and advantages of the present invention will become clearer in the course of the following description of certain preferred embodiments thereof. The description refers to the appended drawings, in which:

Figure 1 is a side elevation of an electric drill equipped with the device according to the invention, the end of which is fitted with an accessory for making holes perpendicular to the surface to be drilled, and having a holder for collecting drilling waste;

Figure 2 is a longitudinal cross section on an enlarged scale through the device shown in Figure 1; and

Figure 3 shows a detail of an accessory for fitting to the device seen in Figures 1 and/or 2 in place of the accessory for making holes perpendicular to the surface to be drilled, or making angled holes.

[0009] Referring to the drawings, and with particular reference initially to Figures 1 and 2, reference number 1 indicates an electric drill comprising, in the ordinary way, a pistol grip 2, a trigger switch 3, and a body 4 ending in the cylindrical head 5 from which extends the driven spindle 6 carrying the chuck holder 7 that holds the chuck 8, from which the jaws 9 emerge to grip the drill bit 10.

[0010] Number 11 is the general reference for the device according to the invention. This device comprises a tubular component 12 provided at one end with an internal annular flange 13 whose inside diameter is approximately equal to the outside diameter of the drill head 5. This flange 13 provided with a split 14 from the two sides of which rise two lugs 15 that can be tightened with a screw and nut 16 in order to squeeze the flange 13 elastically. Reference 17 denotes a tubular component that slides telescopically inside the other end of the tubular component 12. Reference 18 denotes pins projecting radially from the tubular component 17: these slide along elongate guiding slots 19 made in the cylindrical shell of the tubular component 12. Advantageously, these slots have external metric graduations 21 for reasons which will be described later. Reference 20 denotes a cylindrical compression spring, installed with one end against the internal step of the flange 13 and with the other end against the rear end of the cylindrical wall of the cylindrical tubular component 17. The cylindrical component 17 has an internal thread 22 so that special work tools can be attached. This thread 22 extends for a considerable distance along the inside shell of the cylindrical component, for purposes which will be described more fully later.

[0011] One of these tools, which has the general reference 23, is the tool for keeping the drill bit 10 perpendicular to the surface to be drilled, and for preventing the bit 10 wandering away from the exact point where the user wishes to make the hole.

[0012] This tool 23 comprises a cylindrical tubular body 24, preferably of transparent plastic material, its outside diameter equal to the outside diameter of the tubular component 17, with at one end an externally threaded cylindrical collar 25 to allow it to be screwed onto the threaded part 22 of the tubular component 17. This external thread extends, like the internal thread 22 of the component 17, for a distance of some centimetres, for reasons which will be described later. Near the collar 25 end, the cylindrical body 24 contains a diaphragm 26 with a central hole for the drill bit 10 to pass through. Mounted on the free end of the cylindrical body 24 is an annular component 27, preferably of rubber or a material with a high coefficient of friction similar to rubber.

[0013] Operation of the device described will now be obvious. The application of the ring 27 to the surface to be drilled ensures that the drill bit 10 will act exactly perpendicularly to this surface. Moreover, since the ring is made of a material with a high coefficient of friction, such as rubber, it will prevent the device, and hence the bit, from sliding about, even if the surface to be drilled is a hard, smooth surface such as a ceramic tile or a metal plate. Waste formed during drilling is collected in the

space 28 between the ring 27 and the pierced diaphragm 26 and so does not escape into the environment. As the drill bit 10, pushed by the operator, advances into the material, the cylindrical component 17 and the cylindrical body 24 sink telescopically into the cylindrical body 12, in opposition to the action of the spring 20. The degree of penetration of the bit is indicated by the position of the head of the pin 18 in the slot 19, its position being shown by the graduations 21, so that the operator can see at any time how far the bit 10 has advanced into the material. Once the drilling operation is completed, extraction of the bit 10 from the hole is helped and accompanied by the spring 20, which returns the parts to the rest position shown in Figure 2. Waste collected in the space 28 can then easily be disposed of without the risk of dirtying the surrounding environment.

[0014] Depending on the lengths of the bits 10 mounted in the drill, it may be necessary to adjust the length of the component 23. This can easily be done by screwing the parts 25 and 17 in or out to modify the length of this component 23.

[0015] The tool 29 illustrated in Figure 3 is screwed onto the cylindrical component 17 in place of the tool 23. The tool 29 comprises a base 30 to which is attached a threaded collar (not shown) similar to the collar 25 for screwing onto the cylindrical component 17, and a head part consisting of a supporting component 31 on which the ring 27 is mounted. The base 30 and the supporting component 31 are hinged to each other by two diametrically opposite pins 32. These pins may advantageously be tightened so that the two parts 31, 32 can be locked in the desired angular position. These parts may also be provided with a connecting boot or bag (not shown) to retain the drilling waste. The operation of this device will be obvious.

[0016] The present invention is of course not limited to the embodiments illustrated and described but rather encompasses all those variants and modifications which fall within the scope of the inventive concept as claimed below.

Claims

1. Drill device for controlling the angle of the drill bit with respect to the surface to be drilled, **characterized in that** it comprises a tubular component (12) provided at one end with means for fixing it to the head of a drill; a tubular component (17) able to slide telescopically inside the other end of the said tubular component (12); and a tubular tool attached at one end to the free end of the said tubular component (12) and provided at its other end, which is intended to be placed against the surface to be drilled, with a ring of nonslip material (27), a cylindrical compression spring (20) being installed between the said tubular components (12) and (17).

2. Device according to Claim 1, **characterized in that** the said tubular component (12) is provided at one end with an annular flange (13) whose inside diameter is approximately equal to the outside diameter of the drill head (5), the said flange (13) being provided with a split (14), from the two sides of which rise two lugs (15) that can be tightened in order to squeeze the flange (13) elastically around the drill head (5).

3. Device according to Claim 1 or 2, **characterized in that** the tubular component (17) sliding telescopically inside the tubular component (12) carries radially projecting pins (18) capable of sliding along elongate guiding slots (19) made in the cylindrical shell of the tubular component (12).

4. Device according to Claim 3, **characterized in that** there are graduations (21) on the outside of the slots (19) to show how far the bit (10) has penetrated into the material being drilled.

5. Device according to Claim 1, **characterized in that** the said cylindrical compression spring (20) is installed with one end against an internal step of the flange (13) and with the other end against the rear end of the wall of the cylindrical tubular component (17).

6. Device according to any one of the preceding claims, **characterized in that** the cylindrical component (17) has an internal thread (22) for fitting special work tools (23, 29).

7. Device according to any one of the preceding claims, **characterized in that** the tool (23) for keeping the drill bit (10) perpendicular to the surface to be drilled comprises a cylindrical tubular body (24) of outside diameter equal to the outside diameter of the tubular component (17), with at one end a threaded cylindrical collar (25) suitable for screwing onto the threaded part (22) of the tubular component (17).

8. Device according to Claim 7, in which the said cylindrical tubular body (24) is of transparent material.

9. Device according to Claim 7, in which the cylindrical body (24) is provided towards the collar (25) end with a diaphragm (26) containing a central hole.

10. Device according to Claim 7, in which an annular component (27) of rubber or of a material with a high coefficient of friction similar to rubber is mounted on the free end of the cylindrical body (24).

11. Device according to any one of Claims 1 to 6, in which the tool (29) for keeping the drill bit at a predetermined angle with respect to the surface to be

drilled comprises a base (30) to which is attached a threaded collar for screwing onto the cylindrical component (17), and a head part consisting of a supporting component (31) on which the rubber or similar ring (27) is mounted, the base (30) and the supporting component (31) being hinged to each other by two diametrically opposite pins (32) capable of locking the two parts (31, 32) in the desired angular position.

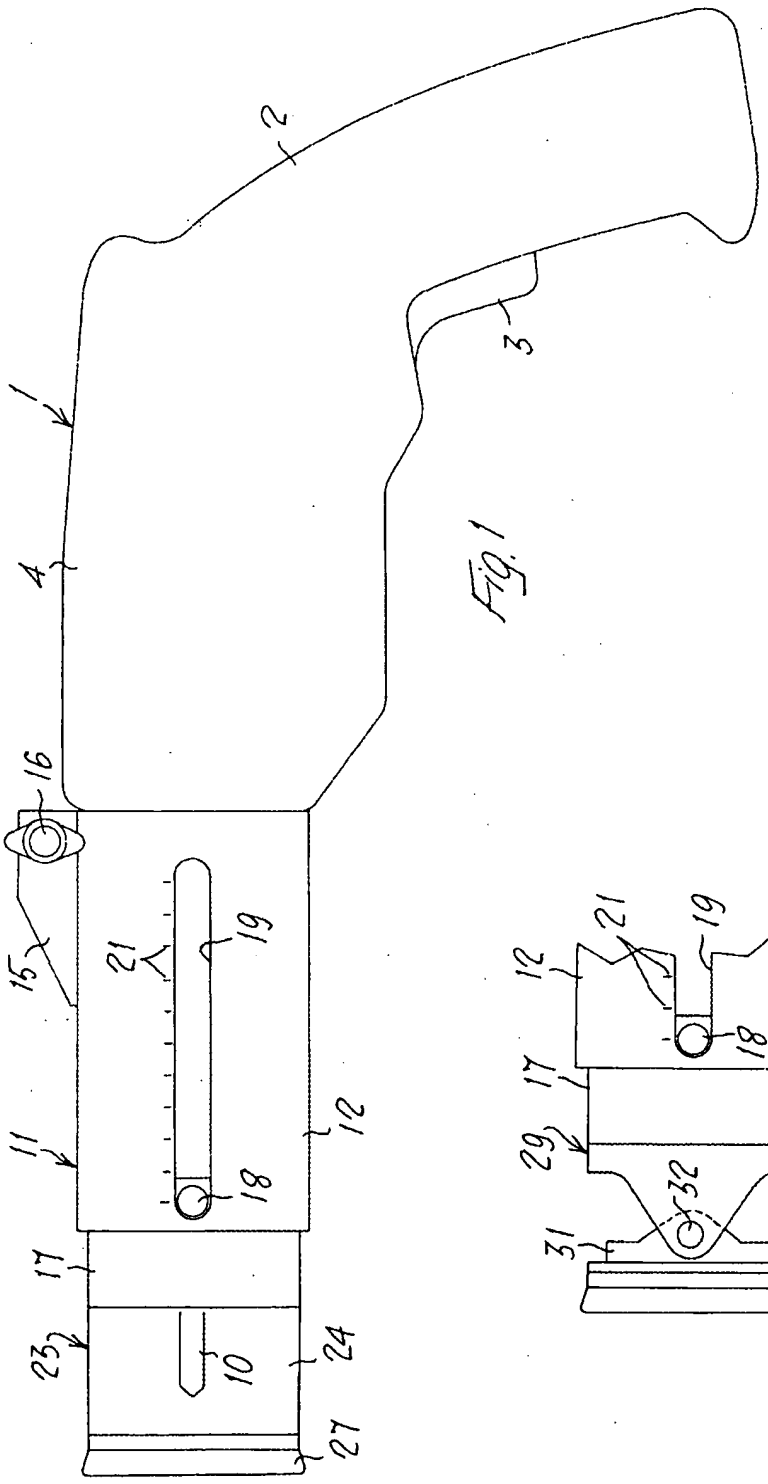

Fig. 1

Fig. 3

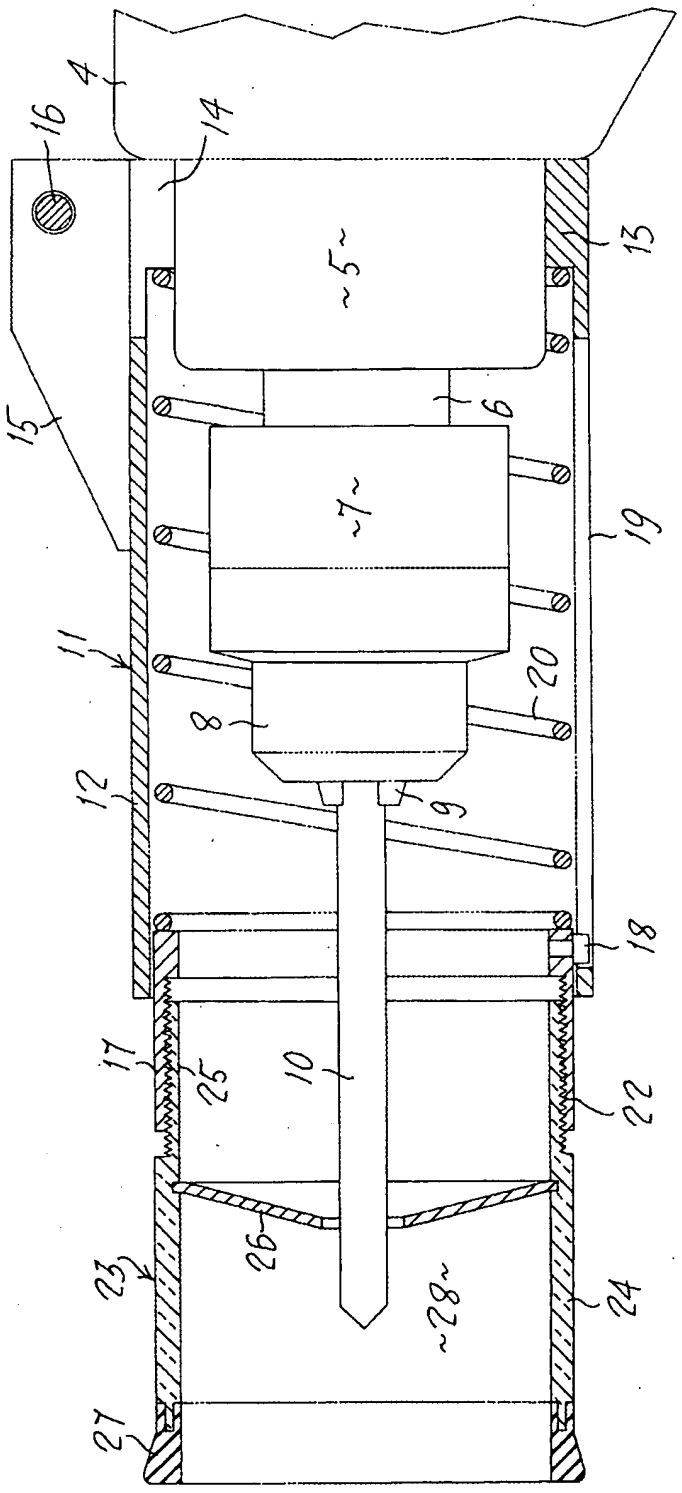

Fig.2

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EUROPEAN SEARCH REPORT

Application Number
EP 05 11 0983

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)
B25H
B25F
B23Q
B23B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	21 March 2006	Lorence, X

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 11 0983

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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